

## AMENDMENT

### LISTING OF CLAIMS:

The following listing supplants all prior listings of the claims.

1. (Currently Amended) A process for producing nano-sized stabilized zirconium dioxide that comprises, sequentially:
  - a. providing an aqueous solution that includes a zirconium salt, ~~and a stabilizing agent, and an acid~~;
  - b. hydrolyzing the solution to form an intermediate zirconium compound, in a controlled temperature, substantially total evaporation process at a temperature higher than the boiling point of the solution but lower than the temperature where there is significant crystal growth; and,
  - c. calcining the intermediate to form nano-sized agglomerates.
2. (Original) The process of claim 1 wherein the zirconium salt is selected from the group consisting of zirconium oxysulfate, zirconium oxychloride, zirconium nitrate, and a water-soluble stabilizing agent.
3. (Original) The process of claim 1 wherein the stabilizing agent is selected from the group consisting of yttrium chloride, cerium chloride, calcium chloride, magnesium chloride, and rare earth oxides.
4. (Original) The process of claim 1 wherein the hydrolyzing step successively evaporates part of the solution, hydrolyzes the zirconium in solution, and substantially totally evaporates the remainder of the solution.
5. (Original) The process of claim 1 wherein during the hydrolyzing step, hydrochloric acid is formed and water is removed.

6. (Original) The process of claim 5 wherein the hydrochloric acid and water are recovered.
7. (Original) The process of claim 1 wherein the hydrolyzing is effected in a spray dryer.
8. (Original) The process of claim 7 wherein the spray dryer temperature is between about 120° C and about 350° C.
9. (Previously Presented) The process of claim 1 wherein the intermediate comprises a thin film of amorphous zirconia.
10. (Original) The process of claim 9 wherein the amorphous zirconia comprises spheres or parts of spheres with thin membranes having a diameter between about 1 and about 100  $\mu\text{m}$  and a membrane thickness between about 30 nm and about 1000 nm.
11. (Original) The process of claim 1 wherein the calcining is conducted at a temperature between about 400° C and about 1300° C.
12. (Currently Amended) A process for producing nano-sized stabilized zirconium dioxide having a crystallite particle size less than about 100 nm that comprises
  - a. providing an aqueous solution that includes zirconium oxychloride, ~~and a stabilizing agent, and an acid selected from the group consisting of sulfuric, hydrochloric, and nitric acid;~~
  - b. hydrolyzing the solution to form an intermediate in a controlled temperature substantially total evaporation process at a temperature higher than the

boiling point of the solution but lower than the temperature where there is significant crystal growth; and,

c. calcining the intermediate to form nano-sized agglomerates.

13. (Previously Presented) The process of claim 12 wherein the hydrolyzing step successively evaporates part of the solution, hydrolyzes the zirconium oxychloride and stabilizing agent together, and substantially totally evaporates the remainder of the solution.

14. (Original) The process of claim 12 wherein during the hydrolyzing step, hydrochloric acid is formed and water is removed.

15. (Original) The process of claim 14 wherein the hydrochloric acid and water are recovered.

16. (Original) The process of claim 12 wherein the hydrolyzing is effected in a spray dryer.

17. (Original) The process of claim 16 wherein the spray dryer temperature is between about 120° C and about 350° C.

18. (Previously Presented) The process of claim 12 wherein the intermediate comprises a thin film of amorphous zirconia.

19. (Original) The process of claim 18 wherein the amorphous zirconia comprises thin film membrane spheres having a diameter between about 1 and about 100  $\mu\text{m}$  and a membrane thickness between about 30 nm and about 1000 nm.

20. (Original) The process of claim 12 wherein the calcining is conducted at a temperature between about 400° C and about 1300° C.

21. (New) A process for producing nano-sized stabilized zirconium dioxide that comprises:

- a. providing an aqueous solution that includes a zirconium salt and a stabilizing agent;
- b. hydrolyzing the solution to form an intermediate and hydrochloric acid and to remove water, wherein the hydrolyzing is conducted in a controlled temperature, substantially total evaporation process at a temperature higher than the boiling point of the solution but lower than the temperature where there is significant crystal growth; and,
- c. calcining the intermediate to form nano-sized agglomerates.

22. (New) A process for producing nano-sized stabilized zirconium dioxide that comprises:

- a. providing an aqueous solution that includes a zirconium salt and a stabilizing agent;
- b. hydrolyzing the solution to form an intermediate, wherein the hydrolyzing is conducted in a controlled temperature, substantially total evaporation process at a temperature higher than the boiling point of the solution but lower than the temperature where there is significant crystal growth, and wherein the intermediate comprises amorphous zirconia that is comprised of spheres or parts of spheres with thin membranes having a diameter between about 1 and about 100  $\mu\text{m}$  and a membrane thickness between about 30 nm and about 1000 nm; and,
- c. calcining the intermediate to form nano-sized agglomerates.

23. (Currently Amended) The process of claim 1 wherein the ~~aqueous solution~~  
~~further includes an acid~~ is selected from the group consisting of sulfuric, hydrochloric,  
and nitric acid.

24. (Previously Presented) The process of claim 12 wherein the aqueous solution  
further includes an acid.